Boeing Technology
Information Technology

AP203 Edition 2

Configuration Controlled 3D Design of Mechanical Parts and Assemblies

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History of AP203

- **Developed by PDES Inc. in early 1990's**
- **Original scope to intelligently represent everything on a engineering drawing**
  - **Tolerances and materials were not ready at the time**
- **Published as an International Standard in December 1994**
- **First STEP Application Protocol**
- **Widely implemented by vendors for CAD to CAD interoperability**
- **Some implementation for PDM to PDM interoperability, largely in-house customized efforts**
- **Planned use for long term data retention**

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Since 1994

- **Subsequent STEP APs refined the PDM area**
- **Interoperability requirements between APs**
  - **Harmonized PDM Schema**
  - **AP203/AP214 harmonization**
- **Modules architecture developed**
- **Extension based on implementations**
  - **Validation properties**
  - **Colors, layers and groups**
  - **3D Associative Text (Text in Space)**

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AP203 Edition 2

- **Update AP203 to new PDM schema**
- **Add extensions from implementations**
- **Use new modular architecture**
- **Use ISO Technical Specification process (fast track)**
- **Documented in HTML**
- **Geometric Dimensions and Tolerances**
  - **Harmonized across APs**
- **Additional capabilities …**

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AP203 E2 Technical Specification (TS)
(Configuration Controlled 3D Design of Mechanical Parts and Assemblies)

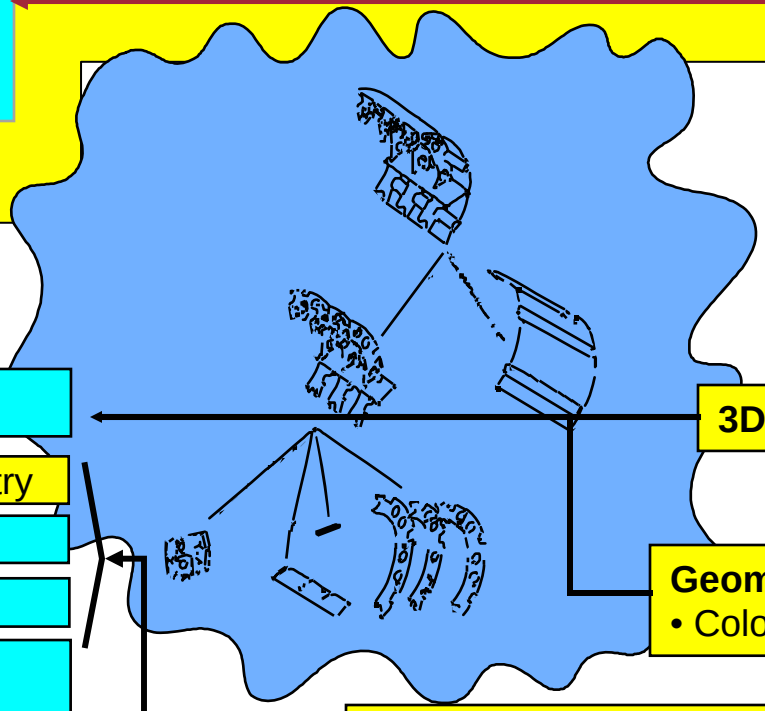
PDM Modules

Product Identification
- Definition
- Version
- Identification

Configuration Effectivity
- Effectivity
- Certification

Work Management
- Work Order
- Authorization

Product Structure
- Assembly structure



Geometric Shapes
- Constructive solid geometry
- Advanced BREP Solids
- Faceted BREP Solids
- Manifold Surfaces with Topology
- Wireframe with Topology
- Geometrically Bounded Surfaces and Wireframe

3D Associative Text

Geometric Presentation
- Colours, Layers & Groups

Geometric Dimensioning and Tolerancing

Geometric Validation Properties

Blue = 203 E1
Yellow = new for 203 E2 TS

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Additional User Requirements – some will be in DIS

- **Industry trends:**
  - **complete 3D Model Based Definition**
    - **ASME Y14.41-2003 Digital Data Definition Practices**
  - **long term data retention (LTDR)**
- **Additional data elements needed**
  - **Associative annotations (AP202/214)**
    - **(includes GDT callouts) .**
  - **Specification control.**
  - **Design material aspects.**
  - **Model based definition (new)**
    - **(support for ISO 16792/ASME Y14.41)**
  - **Parts catalog (new).**
  - **Advanced composites (209).**
  - **Editable solids/features/parametrics**

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AP203 E2 DIS (Configuration Controlled 3D Design of Mechanical Parts and Assemblies)

PDM Modules

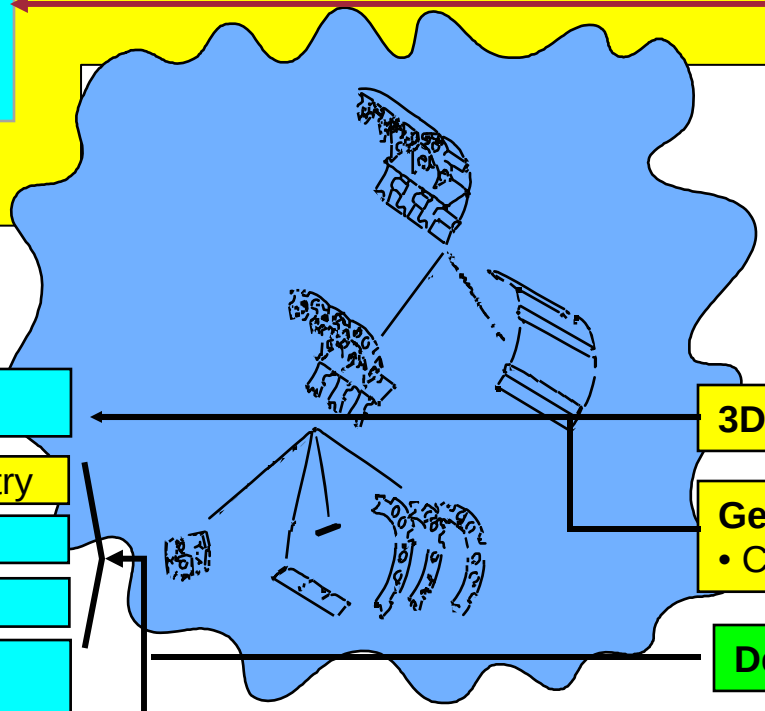
Product Identification
- Definition
- Version
- Identification

Options based configuration

Configuration Effectivity
- Effectivity
- Certification

Work Management
- Work Order
- Authorization

Product Structure
- Assembly structure



Geometric Shapes
- Constructive solid geometry
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3D Associative Text

Geometric Presentation
- Colours, Layers & Groups

Design Material Aspects

Parts Catalog

Surface condition

Geometric Dimensioning and Tolerancing **+ annotations**

Geometric Validation Properties

Blue = 203 E1
Yellow = new for 203 E2 TS
Green = new for 203 E2 DIS

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AP203 Edition 2 Current Status

- ISO/TS 10303-203:2005 published.
- ISO/DIS 10303-203:- including additional capabilities, is in work, could be published in 2006.
- Need to address any issues identified by CAx-IF testing and implementation of GD&T and 3D annotations.

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GD&T in Edition 2 TS

- Representation (“Smart”) - Yes
- Presentation- No
- Semantic relationships in TS
  - All ISO 1101 and ASME Y14.5 tolerance characteristics are supported.
  - Geometric Tolerances, Datums related to geometry/topology.
  - Explicit Dimensioning and direct (“linear”) tolerancing
  - Agreements from other APs to harmonize.
- Sample parts and usage guide have been distributed to implementers.
- Currently in implementation testing at CAX-IF.
  - Theorem Solutions on Unigraphics NX2
  - ITI for I-DEAS.
  - Theorem experimenting with providing hints for 3D annotations

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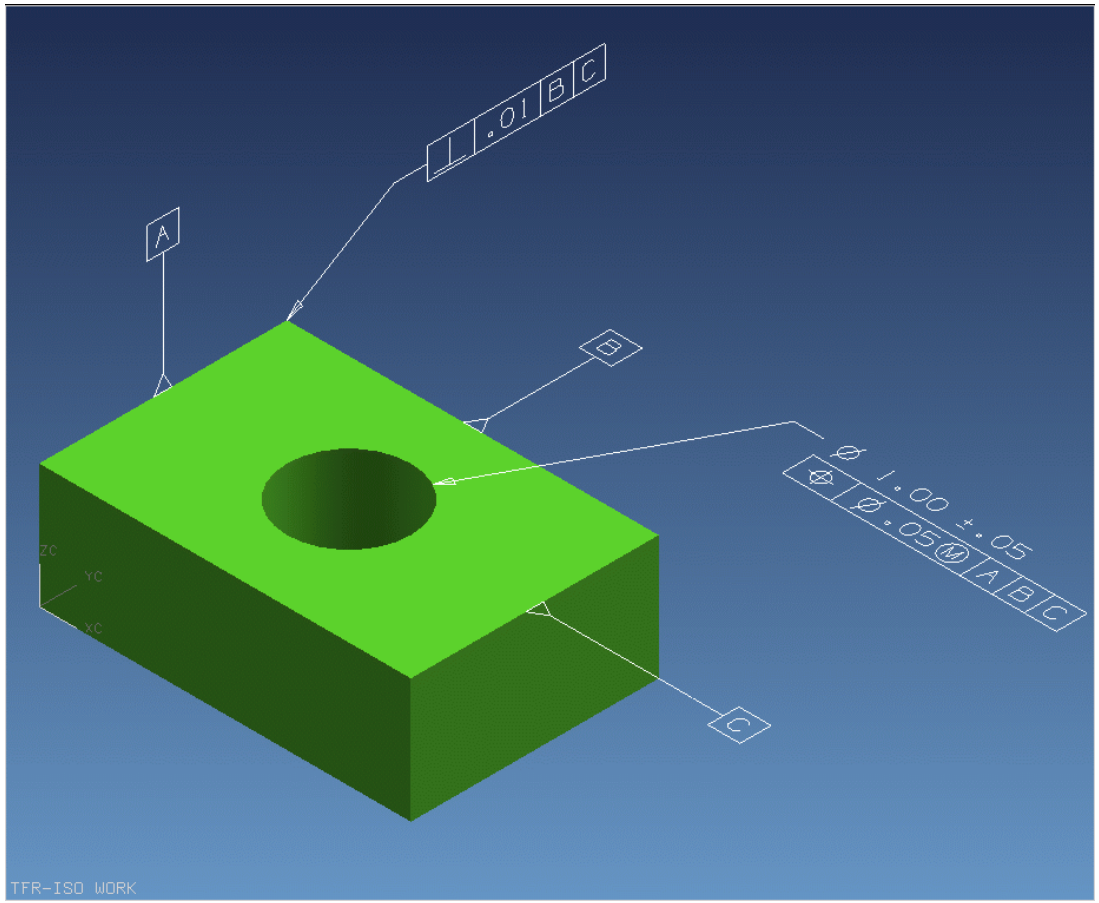
Geometric Dimensions and Tolerances example

- **Datums are associated with face topology**
- **Positional Tolerance**
  - **Tolerance Type**
  - **Tolerance value (.05)**
  - **Modifier (MMC)**
  - **Datum references and order**
  - **Associated to topology of the cylinder**
  - **Drafting standard used (ASME Y14.5)**



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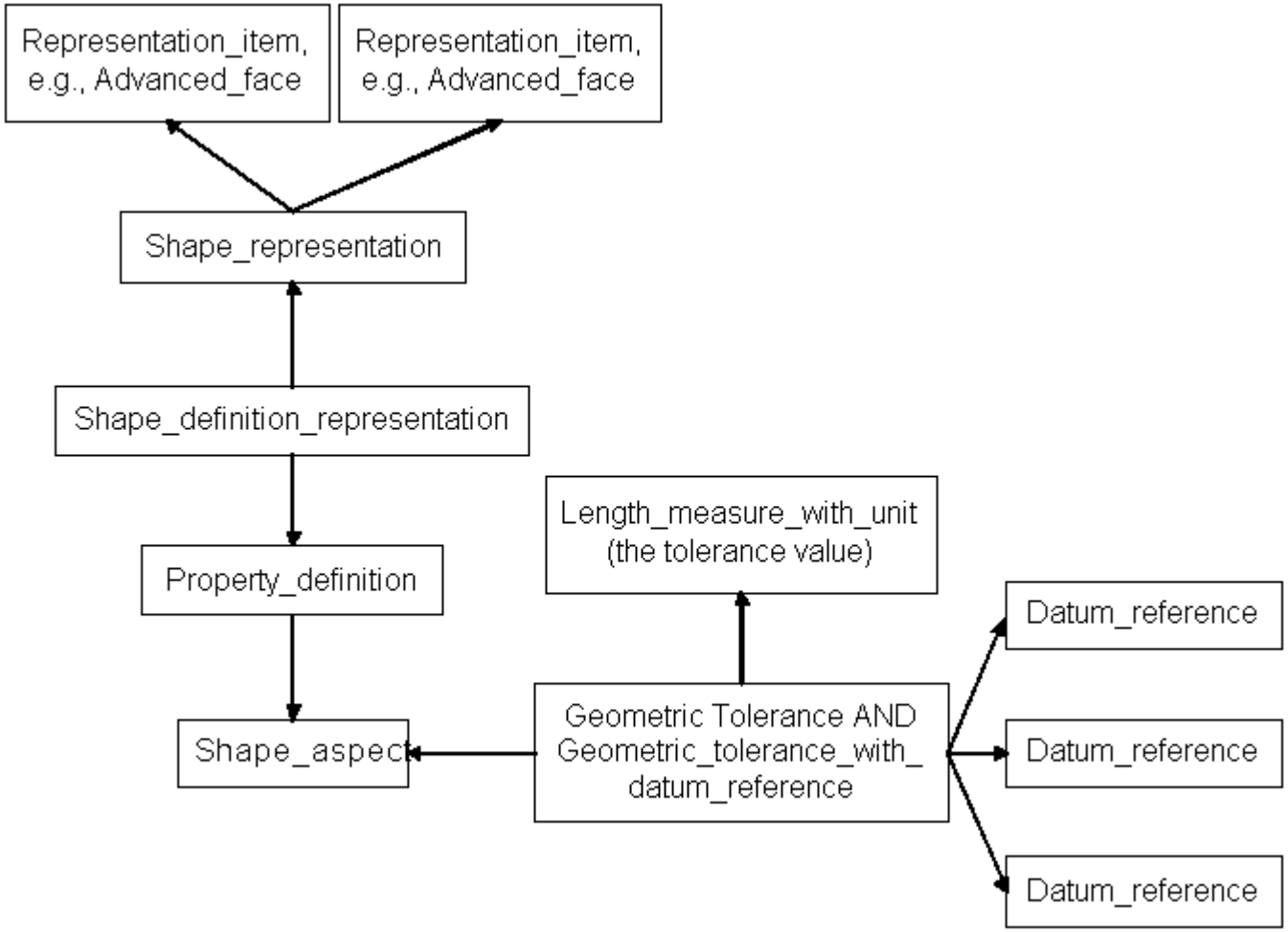

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Questions?

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AP203 Edition 2 Frequently Asked Questions (FAQs)

- **How is AP203 E2 TS different from current commercial AP203 implementations?**
- **How is AP203 E2 TS different from AP214?**
- **What is the AP203 E2 TS and DIS timeline?**
- **When will AP203 E2 commercial translators be available?**
- **Will an AP203 E2 translator be able to read an AP203 file and how will we deal with existing AP203 files?**

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How is AP203 E2 different from current commercial AP203 implementations?

- **Formally adding capabilities to the standard that are currently implemented in commercial translators**
  - **Geometric validation properties**
  - **Associative 3D text**
  - **Geometric presentation of curves and surfaces using colors**
- **Introducing some new capabilities not in current commercial translators**
  - **GD&T**
  - **CSG**

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How is AP203 E2 different from AP214 ?

- **Geometry:**
  - **AP203 E2 and AP214 are almost identical – AP 214 has a couple more shape representations including 2D drafting.**
- **PDM:**
  - **AP203 E2 PDM is the PDM modules. AP214's scope is broader (functional breakdown, physical instances, etc.).**
- **GDT:**
  - **Semantics: AP203, 214 and 224 have agreed on a harmonized GDT semantics set. AP203e2 will include this.**
  - **Annotations: Current SC4 harmonization team will reach agreements to support for ISO 16792 (ASME Y14.41) concepts. Met last week for two days in Myrtle Beach.**
- **Document management same except minor detail - language support in AP203 E2**

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What is the DIS timelines?

- **ISO/TS 10303-203:2005 was published 2005-12-13**
- **DIS timeline**
  - **Publish resource parts as TS Spring 2006**
  - **Submit DIS 4Q2006 for ISO publication**
  - **In ISO catalog by YE 2006**

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When will AP203 E2 commercial translators be available?

- Majority of Extensions already commercially available.
  - Validation properties
  - Colors, layers and groups
  - 3D Associative Text (Text in Space)
- Testing of GDT has started.
- Other new capabilities are TBD.

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Will an AP203 E2 translator be able to read/process an AP203 file and how will we deal with existing AP203 files ?

- If a file has primarily geometry data and little PDM data, the file would likely be processed.
- Deprecated AP203 E1 express identifiers (resulting from PDM schema name changes) are retained in the E2 schema, to assure backward compatibility. An E2 processor should not reject E1 file as invalid.
- How the processor treats such data is up to the vendor. Vendors who already support E1 will likely handle these correctly.
- PDES, Inc has developed a script to convert E1 names to E2 in part 21 files. This is publicly available:
  - **http://pdesinc.aticorp.org/vendor/203e1_e2_converter.html**

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Part 41 Entities	203 E1 Subtypes	203 E2 Subtypes (PDM Modules/Schema Names)
approval_assignment	cc_design_approval	applied_approval_assignment
certification_assignment	cc_design_certification	applied_certification_assignment
contract_assignment	cc_design_contract	applied_contract_assignment
date_and_time_assignment	cc_design_date_and_time_assignment	applied_date_and_time_assignment
document_reference	cc_design_specification_reference	applied_document_reference
person_and_organization_assignment	cc_design_person_and_organization_assignment	applied_person_and_organization_assignment
security_classification_assignment	cc_design_security_classification	applied_security_classification_assignment

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